Patent Claims

Opalescent Glass Ceramic

1. An opalescent glass ceramic, in particular an opalescent glass ceramic as a dental material or as an additive to or component of dental material, comprising at least the components SiO_2, Al_2O_3, P_2O_5, Na_2O, K_2O, CaO and Me(IV)O_2, characterized in that the opalescent ceramic is devoid of ZrO_2 and TiO_2, that the glass ceramic has a Me(II)O content of less than 4% by weight and that the Me(IV)O_2 content is 0.5 to 3% by weight.
2. The opalescent glass ceramic according to claim 1, characterized in that Me(IV)O_2 is composed of 0 - 1% by weight CeO_2 and 0 - 2.5% by weight SnO_2.
3. The opalescent glass ceramic according to claim 1, characterized in that the Me(II)O content is 2 - 3.5% by weight, in particular 2.5 -3% by weight.
4. The opalescent glass ceramic according to any one of the claims 1 to 3, characterized in that the glass ceramic contains the following components:

Component	% by weight
SiO_2	55 - 62
Al_2O_3	13 - 17
B_2O_3	0 - 2
P_2O_5	1.5 - 3
Li_2O	0 - 2
Na_2O	7 - 12
K_2O	7 - 12
MgO	0 - 2
CaO	1 - 4
BaO	0 - 2
Tb_2O_3	0 - 3
Me(IV)O_2	0.5 - 3

the indicated amount of $Me(IV)O_2$ being composed of 0 - 1% by weight CeO_2 and 0 - 2.5% by weight SnO_2.

5. The opalescent glass ceramic according to any one of the claims 1 to 3, characterized in that the glass ceramic contains the following components:

Component	% by weight
SiO_2	58 - 60
Al_2O_3	14 - 15
P_2O_5	2.3 - 2.6
Na_2O	9.5 - 10.5
K_2O	9 - 10
CaO	2.8 - 3.0
SnO_2	1.3 - 1.6
CeO_2	0.3 - 0.4
Tb_2O_3	0 - 2.0

6. The opalescent glass ceramic according to at least one of the preceding claims, characterized in that CeO_2 and/or Tb_2O_3 are fused to obtain a fluorescent property.

7. The opalescent glass ceramic according to at least one of the preceding claims, characterized in that
the glass ceramic has a thermal expansion coefficient (TEC) in the range of 9.0 - 13.5 x 10^{-6}/K, in particular 10.5 - 12.0 x 10^{-6}/K.

8. A method for producing an opalescent glass ceramic according to any one of the claims 1 to 7, in particular an opalescent glass ceramic as a dental material or as an additive to or component of dental material, comprising at least the components SiO_2, Al_2O_3, P_2O_5, Na_2O, K_2O, CaO and $Me(IV)O_2$, characterized in that the method comprises the

following procedural steps:

- weighing in and mixing the components with a mixing ratio according to one of the claims 1 to 6;
- melting the mixture in a furnace;
- quenching the molten mass coming out of the furnace in a water bath and subsequent drying;
- grinding the frit thus obtained in a mill;
- tempering the frit;
- after drying, filling the frit in a mill and grinding the frit;
- sifting the ground frit through a sieve, the sieve opening forming the end.

9. The method according to claim 8, characterized in that the tempering of the frit is carried out in the following manner:

- stacking the ground frits on quartz-coated fire-clay plates,
- placing the fire-proof plates in a furnace, e.g. an electric furnace, heated to a temperature T with 850°C ≤ T ≤ 1000°C,
- removing the plates from the furnace after a time t with 30 min≤t≤60,
- quenching the melted frit cakes in a water bath.

10. The method according to claim 8 or 9, characterized in that the components are mixed in a gyro mixer.

11. The method according to at least one of the claims 8 to 10, characterized in that the mixture is melted in a preferably gas-heated drip-feed crucible furnace.

12. The method according to at least one of the claims 8 to 11, characterized in that after drying, the frit is filled into a ball mill and ground with about 10,000 revolutions per minute.

13. The method according to at least one of the claims 8 to 12,

characterized in that the ground frit is preferably sifted through a sieve having a mesh size M in the range of 80 μm $\leq$M $\leq$120 μm, preferably M = 100 μm.

14. The method according to at least one of the claims 8 to 13, characterized in that the fusing is produced by heating the granulated material to 870 to 970°C.

15. The method according to at least one of the claims 8 to 14, characterized in that the thermal expansion coefficient (TEC) is set to a value $9.0 \leq TEC \leq 13.5 \times 10^{-6}/K$ by the K_2O content.

16. The method according to at least one of the claims 8 to 15, characterized in that the baking temperature of the opalescent glass ceramic is controlled by the proportions of B_2O_3, Li_2O and Na_2O and is preferably in the range of 870°C to 970°C.

17. Use of the opalescent glass ceramic according to at least one of the preceding claims as a dental material or as an additive to or component of dental material.

18. The use according to claim 17, wherein the opalescent glass is a component of inlays, onlays, bridges or crowns.